ward C. Hulburt, and the results necessary to successful work when it

## New Facts About the Stars which he obtained will be of extreme comes for the comparison to be made value to the astronomical photographers when the study of the moon's enly surfaces and the elements of the Learned by Photography Surface is taken up. Comparative reflective powers supply the only means known at present by which to identify elements appearing on the planetary and Junar surfaces, and exact data Surface is taken up. Comparative received the degree of doctor of philosophy at Johns Hopkins and is now doing research work under the Carnegie

### Dr. R. W. Wood, Using Ultra-Violet and Infra Red Rays, Gets Some Astonishing Results

JSING an absolutely new system alone, thus giving a very definite of lunar and stellar photography and employing the largest telescope in the world, Dr. Rebert W. Wood, professor of extaken at night. The fact that there is perimental physics at the Johns Hop-kins University. Baltimore, has just completed investigations as to the sur-faces and arms spheres of the larger planets and, the moon which may prove of the greatest value to astrono-mers the world over. He has found that there is sulphur present on the surface of the moon which may prove of the greatest value to astrono-mers the world over. He has found that there is sulphur present on the surface of the moon wither in a free. surface of the moon, either in a free state of in sulphurous rocks or earth, ultra-violet, a drawing of which, made and has deduced from his photographs of the planet Saturp the theory that its atmosphere is composed, in part at least, of a fine, mistlike dust—something hitherto unguessed by astrono-

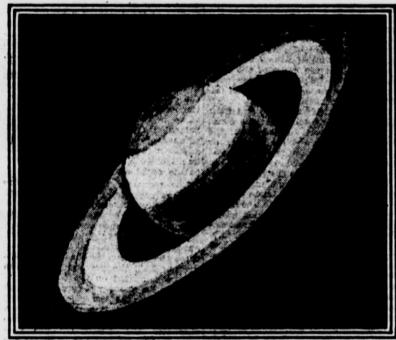
Dr. Wood's photography has been done by means of the ultra-violet and infra-red rays of the sun's spectruma method evolved by him. By compar-ing the reflective powers of the planets' surfaces he has been able to form very definite conclusions as to at least some of the substances to be found here—using the reflective powers of the elements present on the earth as a

ments in astronomical photography at has just returned from a month's stay there. Last summer he prepared for his work at his summer home at East many preliminary trials of his theories at that time. These trials turned out successfully, and therefore Dr. Wood elephone at the California observa-

by Dr. Wood himself especially for THE SUN. is reproduced here, shows a dark belt of considerable breadth about the middle of the planet. This belt was invisible in the yellow and has about come to the conclusion that it denotes a substance in the atmo phere of the planet which stops the ultra-violet rays. This substance he believes to be a fine dust. By dust Dr. Wood means a mist or fine fog and not dust in the ordinary sense of the

If this hypothesis is correct-an work in the same field soon to be undertaken at the Johns Hopkins laboratories and observatory will endeavor to settle this point-it will be a far reachthe Mount Wilson Observatory of the astronomical world, since very little or Carnegie Institution in California, and nothing has hitherto been learned concerning the atmosphere which surrounds the larger planets, just as no explanation has ever been forthco Hampton, Long Island, and made ing as to the nature of the spots which appear on the sun.

Another explanation of the marked dark belt around Saturn is that there took a leave of absence from Johns may be a gas or vapor in that part of Hopkins University and continued his the atmosphere which will absorb the experiments with the aid of the great ultra-violet rays and will not absorb those of a visible light. Before it can be definitely decided which of these His principal discoveries were those two theories is the correct one more in connection with Saturn. He photo-graphed this planet in yellow light, ried on in conjunction with the photo-



Saturn in ultra-violet light. The dark band around the middle denotes either the presence of fine dust in the atmosphere or of a gas which absorbs the ultra-violet rays.

which is visible to the eye, violet, graphs already made. At present Dr ultra-violet and infra-red. The results Wood is rather undecided as to which in each case showed him something of theory is correct, but hopes that he interest in connection with the at-mosphere of the planet, but the de-However, he says that it is more than duction that there is a fine dust in it likely that the presence of the abwas made from the negative procured using the ultra-violet rays.

Ultra-violet is just beyond the perportant experiments were made by not been able to get any that he which will penetrate almost any substance. The reflective powers of all en ascertained by ultra-violet photography, and when in a photograph tive power of some part of its surface corresponds with that of a known elewith a reasonable degree of certainty that the planetary element is identical

In Dr. Wood's experiments no camera was used. The photographic plate lens of the giant telescope, and after it had been trained on the planet elapsed. Specially prepared plates had lowing the course of the planet. sary during the whole photographic operation to prevent the marring of vigils.

the picture by too hasty a movement In the photographs of Saturn the will be performed directly from the

has a focus of eighty feet and a re- showed up strikingly. such photographic work as Dr. Wood light and the outer one dark.

penetration of all other rays than those Ing, were discovered. In the infra-red him to continue the experiments and with which it was desired to take the rays Jupiter's cloud belts, which are to try to work out a complete system picture. Specially prepared screens, similar in nature to the regular ortho- invisible, and the few surface markcromatic screens used in ordinary pho- ings which were to be made out in may be made upon the pictures he dography, were employed in making infra-red rays, but a vapor of bromide and violet light photographs the inhad to be employed in the case of the tensity of the markings and cloud-

extremely poisonous, was contained in a glass cell in front of the lens. Ex- an explanation of these differences. treme care was necessary to prevent is identical with the asphyxiating rays and that certain others will prove

sorbing gas will be eventually demonbe disproved.

It is interesting to note that with could feel sure were representations of the surface of the bodies. The atdepth and density that even the ultraviolet rays will not penetrate it clear-ly, and therefore the moon is the only body on which he has been able to

In the pictures of Saturn in yellow light, one of which is reproduced iere, there is a faint dark line around the body of the planet, for which no adequate explanation has as yet been given. A polar ring-the dark space at the top of the planet-is less proand no reason for this phenomenon

has been worked out. In taking the pictures, and especially in taking those in the infra- there is sulphur present in the moon, Wood moved it slowly, following red rays, extremely long exposure had probably in rocks or other hard subthe movement of the star until the to be made, necessitating all night ma- stances. necessary time for the exposure had nipulation of the telescope, slowly folto be used and great care was neces- eral assistants at the Mount Wilson but are clear enough to bear consider-Observatory aided Dr. Wood in his able enlargement. The laboratory

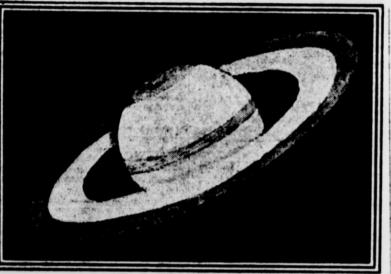
rings which are always connected negative, since the plates used were The giant telescope at Mount Wilson with that planet in the popular mind especially prepared for the experiflector five feet in diameter. Its great of pictures by all lights the two rings scientific value of the pictures is consize makes it particularly valuable for were plainly visible, the inner one tained entirely in the plates and not

Jupiter also came in for a good deal In the case of the pictures made by the different rays a screen had to be periments, and some facts of interest, was engaged in the photography of placed before the lens to prevent the but as yet of no very certain meanth the planets and of the moon has led distinctive of that planet, were almost of facts about the heavenly bodies e employed in making the other lights practically disap-the yellow, violet and peared. In the ultra-violet, yellow. belts varied, but in all they were more This vapor, a thick brown gas and prominent than in the infra-red. The Hopkins physicists are now seeking it. Dr. Wood's ultra-violet photogra-

gases used by the German army in the opaque to them. Thus by studying founded on scientific data and will European war. The ultra-violet rays each photograph it may be possible to



Dr. Robert W. Wood



strated and that the dust theory will Saturn in yellow light. The polar cap is lighter and the dark band almost entirely absent.

has been very much easier to deduce facts about the surface of the moon amined in the course of the experi-

Wood has been able to conclude that

Sev- experiments are of very small size In the case ments with the various lights, and the in the prints made from them. .

The success which Dr. Wood the planets and of the moon has led merely from the observations which has obtained. The moon will furnish a subject of exhaustive study. While there are many theories about the geographical features contained on its surface, very little work has been done on the chemical composition of it. Dr. Wood's ultra-violet photography has opened the way to an authorise. The committee in charge of the work is composed of the Rev. Charles E. Brugler, Miss Martha A. Jamison, Miss Eva Ball Glover and Mrs. phy has opened the way to an authori-It is well known that certain gases tative study of the surface of the moon and any discoveries which are made under this system will be not have to be built up upon sup-

of the planets and has gone into the subject of the spots on the sun, which have for so long been known and so long unexplained. Dr. Hulburt remum of result. Thus America pleads a
cently made two remarkable photospecialized service: graphs of these spots, showing them be of a clear cut and regular shape; but his work in this direction has not to their nature.

foundation at Baltimore. He has

made many interesting photographs

it, just as he has been the leader in several other important systems of research. He has made the application calmiy, as if it were just one of the hobby, and has popularized the sub- He speaks of it modestly and is prone

physicist. He turns his efforts always | charged. rather to the practical application of When the writer called upon him to lication—and tells of the scope of his things than to their scientific classifi- find the secret of his power-this organization his brow knits-one, two cation and study, although he is one "vitalizing of money"-and announced three, four, five, yes, with a very of the most eminent of the world's to him that he had been described as a definite trace of six wrinkles. ception of the eye. At the other end all the photographs of the planets when the subject of the spectrum of the sun's rays is all the photographs of the spectrum of the sun's rays is and some of them eastly and with a tween the cycles when the subject of the sun's rays is and some of them eastly and with a tween the cycles. Yet he is but on the sun's rays is an appular very human handshake said. "Alas for Yet he is but on the sun's rays is an appular very human handshake said." physicists. He has written a great new and particularly bright financial if you look sharply there are four be-

# C.A. Stone, "Money Vitalizer"; A New Figure in Wall Street

known as the American International Corporation, and is to set itself to the task of healing the financial wounds that the world suffers as the result of the present war, people outside of that mysterious world known as "high financial circles" wanted to know who

Mr. Stone was, what he had done and what he proposed doing. But when President Frank A. Vanderlip of the National City Bank further announced that this same. Charles A. Stone was "a vitalizer of money" there was surprise as well as curiosity. It was evident that here was projected into the financial firmament a new star with a new power, or at least a power that never before had been defined in such terms. There were "captains of industry," "captains of finance," "high financiers," "trust magnates," plain "financiers" and ordinary "promoters," but "a vitalizer of money"—here was a brand new definition of a power as well as a brand

The American International Corpo ration starts with a capital of \$50,000,000, but when you consider the men interested in it you will probably be of the mind that three hundred, four hundred, five hundred millions of dollars stand back of that sum available for use if needed. That one fact will give an idea of the prodigious problems that Mr. Stone has upon his hands—the magnitude of the enterprise, the patriotism behind it, its

First, it is patriotic in that it con-templates placing the wealth of America where it will draw the attention of the nations of the earth to America's readiness to help to repair quickly and efficiently the ravages and wastes, as well as to assist in the development of latent possibilities wherever and whatever they be. Thus America goes forth to construct.

Second, it is humanitarian in its essence in that it gives America opportunity to aid those in need of counsel, cash or credit. Thus America goes forth with the helping hand.

Third, it is not self-seeking. It seeks not to fasten "Americanism" nor any of the political, religious or social doctrines of America upon any nation, but rather to give the fullest measure of efficiency through cooperation with every nation, according to its needs, so ciently work out the problems begotten

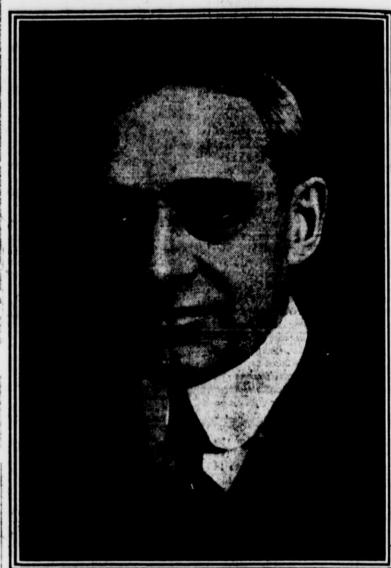
Thus America goes forth as an effi-

"service"—that new ethical thought of business thoroughness wherefrom proceeds the promotion of the intertion of every available ounce of energy, whether it be of thought or action, where it will produce a maxispecialized service!

a revolution in astronomical methods. For this vision is Mr. Stone's-his organization working coordinately will attend to the details.

Mr. Stone contemplates his of liquid air to practical purposes a everyday duties that fall to his lot. to blush if you express wonder or ad-Dr. Wood is distinctly a popular miration that he should thus be

THEN the National City Bank announced the other day that Charles A. Stone had been selected to pilot the new \$50.000.000 International Company and His Methods



known! Wall Street may be measured-or

ome of the men in it-by the method of greeting. There are handshakes and handshakes-some of them being nearly human-but the Stone handshake is famous among his intimates because it is so human.

The Stone hand is large-very large as Wall Street hands go. The palm is ests of others through the conserva- generous in breadth and length. And plishment of things with the least lost tion of their resources; the intelli- then the fingers-they seem to wind motion-that every enterprise is a gent application of every ounce of all around your own and hold you-"man-power" as distinguished from just for a second—absolutely hold you horse-power toward the reclamation in a greeting that is sincere. You feel of the "slack" into profitable by-prod- at home instantly because the first the efficiency test; that there are me uct; the elimination of lost motion, contact impresses you that here is a surveys to be made; that department duplication of effort, friction and hand that gives a vital grip; already must be measured as to their possibiliwastes in fine, a thorough coordination begin to sense the Vanderlip ties and then coordinated in their work in order to sense the vanderlip ties and then coordinated in their work in order wastes. In fine, a thorough coordinate of the vital pull necessary available gives of ended to be a very ava

up in a comfortably cut suit of gray it be erecting a Woolworth Building It required genius to conceive such Whether nature made him blond or plan; it will require a genius to swarthy you cannot determine because oring it to the full fruition of success, his hair is white and sparse. It is well bring it to the full fruition of success. Some one has defined genius as the "ability to take infinite pains." In the case of Charles A. Stone it is better case of Charles A. Stone it is better to the tubes one moment, talks as deliberately and with as well chosen liberately and with as well chosen large as Woodrow Wilson. And language as Woodrow Wilson his eyes-you determine they're blue, to find them gray as the light shifts, and they glint suspiciously of brown when he enthuses over the type of men latest efficiency problems. He believes in the fullest publicity. but modestly objects to

theme of it. No matter what the question you put to him the answer is sure to get into the channels of "efficiency. And as he talks-a ways not for pub-

which he has taken Dr. Wood took mostly at East Hampton the subject of the earth's elements many books, some of them textbooks star he laughed hearthy and with a tween the eyebrows.

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In the laughed hearthy and with a tween the those twenty-five years through all of they say, twenty-five of which years

and throughout the Canadas as one America's foremost efficiency experts. He will tell you anything you want

to know about Stone & Webster of Boston, New York and Chicago. It was founded for efficiency. Efficiency has been the pivotal point of its every action. And if you ask him just what this efficiency thing is he tells you it is the elimination of waste—the accomsolved; that every supposed solution must come through the application a so as to get the vital pull necessary There is six feet of Mr. Stone done to make of business a success, whether

> making needles or financing the Amer Stone & Webster's is a wherein that word efficiency pl major part. It was built of

ciency idea that he prints ev an efficiency magazine where

his staff and contributors di study, a scientific study Stone's face shows the depth work.

But then too he is a sime abstruse, the more appeal the public utility kind under agement-one for each year They dot as many States and er-Canadian border. No matter bow they were when Mr. Stone got the his efficiency treatment made

whole and strong enough their usual work. very active because he is a constru tion engineer as well as an efficient

trolley roads, and public util

porations know no greater experhave to do with just such p But the "vitalising of mone

The problem is so simple that a child in the kindergarten can understand !! Gold is no better in the pi ashes or clay. Labor "vital

prepare it. Mix ashes with and you make for a foundation But-gold even when it con the mint is still not "vitalized

the ashes and cement, nor is to "vitalize" them; in the bricklayer, in another a mas So Mr. Stone is that

money-better, they say. Many men lay brick, there masons, and money has been work these many

able result. But the wes of expert knowledge necessary

possible to carry the invisible ray system of photography further and to learn' practically all that there is to know about the general properties of the lunar surface.

Dark spots appeared on the moon's surface in ultra-violat light photographs and did not show at all in the photographs made with the visible surface in ultra-violat light photographs made with the visible surface surface in ultra-violat light photographs made with the visible surface in this respect the spots have the properties of sulfur, and Dr.

Wood has been able to conclude that

saljo freezes over.
Visitors and members of the villa colony are making plans for the holidays and arranging so that every one in and about the resort will have plenty of good cheer. Many prominent persons will follow the precedent of other years and send out baskets and boxes of food and presents to the unfortunate. Some of those who will follow this custom are Mrs. George Gould of New York, Mrs. George Fales Baiser of Philadeiphia. Mrs. Jay Gould, who takes a reacher in the Episcoper Fales Baiser of Philadeiphia. Wistors at the Country Club over the Week end included C. B. Craig. W. P. Legast, Prederick Pouch. C. R. Van Mrs. B. Another local district purse has the distributing of these packages they always reach the deserving.

Another local organization that will play a prominent part in dispensing Cub' of the Presbyterian Church. They send boxes and bags to the men and women inmates of the Presbyterian Church. They send boxes and bags to the men and women inmates of the Truax Poor Farm at Belman, N. J., and other institutions of the week's entertainment programme. Regular Wednesday and Saturday

Mrs. B. O. Bowers, Miss Margaret A. Connor and Miss Anna E. Gruber of New York. Hotel Virginia—Miss Margaret Fletch. Verno, C. Bernan, B. Gromp and Miss Josephine Embler, Dr. A. M. Johnston, the Miss Josephine Embler, Dr. A. M. Silver Man Mrs. E. Pattison, Miss Josephine Embler, Dr. A. M. Silver Man Mrs. E. Ellis of New York.

White Sulphun Lander Fletch. Verno, Capture, Miss Josephine Embler, Dr. A. M. Johnston, the Miss Josephine Embler, Dr. A. M. Johnston, the Miss Josephine Embler, Dr. A. M. Silver Miss Josephine Embler, Dr. A. M. Silver M. Miss Josephine Embler, Dr. A. M. White Sulphun Lander Miss Josephine Embler, Dr. A. M. White Sulphun Lander Fletch. Miss Josephine Embler, Dr.

Another local organization that will play a prominent part in dispensing cheer is the children's "Empty Stocking Club" of the Presbyterian Church. They send boxes and bags to the men and women inmates of the Truax Poor Farm at Belmar, N. J., and other institutions at Belmar, N. J., and other institutions at Belmar, N. J., and other institutions at Belmar below the season. There for the balance of the season. There to the balance of the season.

station, next week. The choral pro-gramme in connection with the tree will be much more elaborate than hast year. Christmas carols will be sung on all the Tunis G. Bergen. The tree will be do-nated by Archibald D. Davis.

nated by Archibald D. Davis.

Entries from prominent gun clubs are coming in rapidly for the annual amateur individual trap shooting tournament, to be held by the Laurel House

of the week's entertainment programme.

Regular Wednesday and Saturday dances will be held at the Palmer House for the balance of the season. There will also be a card party each Thursday evening.

Among the arrivals at the hotels this week were:

Level is the Direction of New York.

And Mrs. Leon Feinberg, A. M. Davis and Mrs. T. Altman of New York.

Florence-in-the-Pines—J. L. Solomon, R. S. Seligman, S. Lawrence Stern, Mrs. and Mrs. Edgar B. Mayer, Miss Fisher, Mr. and Mrs. Signary in the spring.

Mayer, Miss Fisher, Mr. and Mrs. Signary in the spring.

New York.

Manhattan—Mrs. R. S. Seligman, Mr. Blace interested, was ma the place may be in a paney in the spring.

Plans are under wa New York.

Manhattan—Mrs. R. S. Seligman, Mr. Blace interested, was ma the place may be in a paney in the spring.

New York. Much interest is being shown in the for the balance of the season. There will will also be a card party each Thurs-

week were:
Laurel-in-the-Pines—John Moffat, Mrs.
S. B. Chapin, Mr. and Mrs. L. P. Carter, Floyd Carter, Miss Helen Curtis, George C. Heilaird, Mr. and Mrs. C. H. Ullmann, Miss Lucile Vogel, Mr. and Mrs. John Vogel, Louis J. Rosenberg, Jr., Mr. and Mrs. Herman Mrs. A. J. Fuller, Mrs. K. Yavronyan, Leavitt J. Hunt, Mr. and Mrs. Miss J. Serison of New York.

J. Rosenberg, Jr., Mr. and Mrs. Herman Kaplan, Mrs. Louis S. Spiegel and Miss J. Serison of New York.

ASHEVILLE.

ASHEVILLE.

ASHEVILLE, N. C., December 11.—The

Joseph A. Flynn, Joseph M. Fine, Miss
May Kurtz, W. C. Adams, Mrs. A. R.
Stern and Miss M. C. Daley of New
York.

ASHEVILLE, N. C., December 11.—The magnificent weather still holds in Asheville, and so far there has scarcely been a bint of winter. The halow supplies are the only ones which will penetrate determine just what vapors and gases it, and therefore the reproduction of the planet on the planet on the photographic plate was very unlike a picture taken in ordinary light, and showed the surface and atmosphere in ultra-violet light.

The moon, photographs of which Dr.

The ultra-violet rays determine just what vapors and gases position.

The reflective powers of the various chemical elements on the earth have been made the subject of an exhaustive study recently at the moon, photographs of which Dr.

The moon of the different rays with the known properties of gases on earth.

The moon, photographs of which Dr.

The moon of the different rays with the known properties of gases on earth.

The moon, photographs of which Dr.

The moon of the different rays with the tourist, and clear days attract the tourist, and clear days attract the tourist, and there has not been this autumn the usual there has not been this autumn the u

that one scarcely notes the change in have become useful through

are interested, was made public last week | and energize gold-the and work is being rapidly pushed that Plans are under way for the construc-

tion of an artificial ice skating rink at the Greenbrier on the terrace leading from the dining room of the hotel, able result. But the workskating promises to be as popular here recognizes that demands and as in New York, and winter and holiday | than ever before for men w visitors will enjoy the opportunity of expert knowledge necessar skating in a place so convenient to the money work more effective tea room and hotel.

The honeymoon colony here has been years agone. the task is greater in second that it is the task is greater in second the item of the task is greater in second that it is the task is greater in second that i arrive at the Greenbrier, the Commissioner of Public Works in New York city, Ralph Folks, and his bride being among the week's arrivals.

among the week's arrivals.

Mr. and Mrs. Frederick Burnham
Stimson of New York, who spent their
concymoon at the Greenbrier, motored
back to New York via Washington this Brooklyn made the trip here in their automobile in four days. Motoring is becoming a favorite mode of reaching White Sulphur.